

1      **Claims**

2      1. Apparatus for wireless duplex communication,  
3      comprising, a first optical transceiver having a  
4      first optical transmitter and a first optical  
5      receiver, a second optical transceiver having a  
6      first optical transmitter and a first optical  
7      receiver, the first and second optical transceivers  
8      being located at the opposite end of an optical  
9      communication line formed thereby, wherein the  
10     output of each of the optical transmitters is a  
11     diverging beam of incoherent electromagnetic  
12     radiation arranged to have a cross sectional  
13     diameter which is larger than the cross sectional  
14     diameter of the respective optical receiver at that  
15     point on the communication line at which the  
16     respective optical receiver is situated.

17     2. Apparatus as claimed in Claim 1 wherein the  
18     optical transmitter emits electromagnetic radiation  
19     having a range of wavelengths.

20     3. Apparatus as claimed in claim 2 wherein, the  
21     optical transmitter emits radiation in the range 800  
22     to 900 nanometres.

23     4. An apparatus as claimed in Claim 1 wherein the  
24     optical transmitter comprises a light emitting diode  
25     which provides the diverging beam of incoherent  
26     electromagnetic radiation.

27     5. Apparatus as claimed in claim 4 wherein the  
28     optical transmitter comprises the LED and further  
29     comprises at least one optical condenser lens, the

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1       input to the optical condenser lens being provided  
2       by the LED and the output of the optical transmitter  
3       being provided by the optical condenser.

4       6.   Apparatus as claimed in claim 1 wherein the  
5       optical receiver consists of an optical condenser  
6       lens, diaphragm and photodiode, wherein the  
7       diaphragm is installed in the focal plane of the  
8       optical condenser lens.

9       7.   Apparatus as claimed in claim 6 wherein the  
10      distance  $\Delta$  between the photodiode and the diaphragm  
11      situated in the focal plane of the optical condenser  
12      lens is defined by the formula

13       $\Delta = b F / D_c$ , where  
14      b - diameter of the light-sensitive site of the  
15      photodiode,  
16      D<sub>c</sub> - diameter of the optical condenser lens.

17      F - Focal distance of the optical condenser measured  
18      from the lens of the optical condenser to the centre  
19      of the stop aperture.

20  
21      8.   Apparatus as claimed in claim 6 wherein the  
22      input of the optical condenser is the input of the  
23      optical receiver, and the output of the photodiode  
24      is the output of the first optical receiver.

25  
26      9.   Apparatus as claimed in claim 1 wherein the  
27      beam angle  $\theta$  characterizing of the first optical  
28      transmitter and the first optical receiver of each  
29      of the said transceivers is defined from the  
30      following condition:

1 Tan  $2\theta = a / F$ , where  
2 a - diameter of the diaphragm aperture;  
3 F - focal distance of the optical condenser measured  
4 from the lens of the optical condenser to the centre  
5 of the stop aperture.

6 10. Apparatus as claimed in claim 9 wherein the  
7 beam angle is between 30 and 60 angular minutes.

8 11. Apparatus as claimed in claim 1 wherein the  
9 distance between the optical transmitter and optical  
10 receiver of a transceiver is greater than or equal  
11 to  $d/2$ , where  $d = 30\text{cm}$ .

12 12. An apparatus as claimed in claim 1 wherein an  
13 input of the optical transmitter of the first  
14 transceiver is connected to an output of a converter  
15 through a modulator, and an output of the optical  
16 receiver of the first transceivers is connected to  
17 an input of a demodulator, the output thereof being  
18 connected to an input of a converter.

19 13. An apparatus as claimed in claim 1 wherein an  
20 input of the optical transmitter of the second  
21 transceiver is connected to an output of a converter  
22 through a modulator, and an output of the optical  
23 receiver of the second transceivers is connected to  
24 an input of a demodulators, the output thereof being  
25 connected to the input of a converter.

26  
27 14. Apparatus as claimed in claim 12 wherein the  
28 converter is made in the form of a transformer,  
29 which transforms the signals of the input discrete  
30 information into a coded signal using the Manchester

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1 code during transmission, and which is capable of a  
2 reverse transformation of signals coming from the  
3 outputs of the respective demodulators during  
4 reception.

5 15. Apparatus as claimed in claim 1 wherein each  
6 optical transceiver further comprises a second  
7 optical transmitter and a second optical receiver.

8 16. Apparatus as claimed in claim 12 wherein said  
9 transceivers are connected to the input of the  
10 respective demodulators through a summator.

11 17. Apparatus as claimed in claim 14 wherein the  
12 input of the second optical transmitter of each of  
13 the transceivers is connected to the output of the  
14 respective modulator, and the outputs of the first  
15 and second optical receivers is connected to the  
16 input of the respective demodulator through a  
17 summator.

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